

PATENT SPECIFICATION (11)

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DRAWINGS ATTACHED

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- (21) Application No. 2182/72 (22) Filed 17 Jan. 1972 (19)
 (44) Complete Specification published 12 Dec. 1973
 (51) International Classification B32B 7/06 A47G 27/02 B32B 27/12



(52) Index at acceptance

B5N 176 178 17X 17Y 184 192 22X 251 252Y 254Y
 282X 282Y 290Y 291X 291Y 314 321 420 421 422
 42X 55Y 57X 63X 668 67X 67Y 714 71X 73X
 790 807
 A4S 1J 1M

(54) TACKY MAT STACK

(71) I, JOHN JOSEPH NAPPI, of 80 Beckley Road, Berlin, Connecticut, United States of America, a citizen of the United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates generally to a tacky mat stack adapted to remove accumulated dirt particles from the underside of shoes or other traffic during passage thereof across the mat. More particularly, it is directed to a new and improved tacky mat construction which facilitates the easy sequential removal of each uppermost mat sheet from the stack.

A tacky mat stack of the type involved in this invention has been described in detail in my earlier United States Patent No. 3,083,393 (U.K. Specification No. 1,138,103). Broadly, it consists of a plurality of superimposed coextensive sheets, each having a pressure-sensitive adhesive on the top surface thereof. As will be appreciated, the tightly woven fabric or cloth backing of each adhesive sheet necessarily exhibited sufficient strength to be stripped or peeled from the stack without tearing or rupturing. Accordingly, a tightly woven, strong and sturdy fabric has heretofore been used for this purpose.

Unfortunately, the constant passage of pedestrian traffic across a stack containing several adhesive sheets constantly forces the cloth backing of each sheet into intimate engagement with the adhesive tread surface on the adjacent underlying sheet. This disadvantageously causes the adhesive to penetrate the cloth backing, resulting in the tight bonding or welding of the superimposed sheets to each other. This problem is particularly evident on the lowermost sheets of the stack and creates substantial difficulty in

effecting the desired stripping or peeling of the soiled layers from the mat stack.

Accordingly, in my United States Patent No. 3,501,797 (U.K. Specification No. 1,243,445) there is described a stack construction incorporating a transversely extending pull string at one end of each sheet for effecting preliminary release of the end portion of the top sheet. As indicated in that patent the pull string is merely interposed between adjacent sheets and is not secured thereto. As the string is pulled from its rest position, it effects a sweeping motion to produce the desired initial releasing action. However, this construction does not reduce the tendency of the sheets to adhesively weld to one another. Additionally, the sheets of the mat stack are not provided with means for securely gripping the individual sheets themselves, and unless great care is taken to ensure the continued separation of the string-released sheet portion, it will readily reengage the underlying sheet and due to its tacky nature will immediately adhere thereto causing substantial difficulty in effecting the desired separation.

Attempts to insert conventional release layers, such as a layer of silicone treated paper or the like, between the tacky mat sheets of the stack in order to prevent the undesirable bonding or welding of these superimposed sheets has proved unsatisfactory. Such release layers disadvantageously permit sliding and other movement of the sheets relative to each other, thereby creating a safety hazard for the user of the mat and unwanted adhesion of the top mat sheet to the pedestrian traffic using the mat.

Accordingly, it is a primary object of the present invention to provide a new and improved tacky mat stack of pressure-sensitive adhesive coated sheets exhibiting ease of separation, coupled with relative immovability between the sheets of the stack during use.

The present invention provides a tacky

mat stack suited for the passage of pedestrian traffic thereacross and the concurrent adhesive removal of dirt particles from said traffic by the tread surface on the uppermost sheet of said stack, and comprising a plurality of superimposed tacky mat sheets of composite laminar construction wherein each superimposed sheet comprises a flexible support film having an integral adhesive-impermeable barrier surface extending across essentially the full underside thereof and a pressure-sensitive adhesive coating carried on the top side of said support film and forming an upwardly facing pressure-sensitive adhesive tread surface of the sheet, said coating being in secure non-delaminating engagement with said support film to provide said composite laminar structure, said barrier surface preventing penetration therethrough of the adhesive carried by an underlying sheet and consequent adhesive welding of super-imposed sheets during the passage of pedestrian traffic across the stack, and said barrier surface facilitating easy separation of each topmost sheet after passage of pedestrian traffic thereon while preventing inadvertent relative movement between the superimposed sheets of the stack.

The sheets can incorporate materials that independently might not exhibit the requisite strength characteristics but when combined provide an extremely strong and durable structural relationship in a highly efficient and economical manner without disadvantageously increasing the thickness of the adhesive sheet structure.

The sheets preferably consist of a thin, highly flexible support film forming an adhesive barrier surface on the underside of the sheet, a reinforcing fibrous web coextensive with the support film and firmly secured thereto and a pressure-sensitive adhesive coating carried by the support film, the adhesive coating being in secure engagement with the reinforcing fibrous web. The adhesive coating penetrates and embeds the fibrous web therein and assures unified co-operative action between the supporting film and the reinforcing web.

A better understanding of the invention will be obtained from the following detailed description and the accompanying drawing which set forth an illustrative embodiment of the invention.

In the drawing:

Figure 1 is a perspective view of an embodiment of the tacky mat stack of the present invention mounted within a suitable frame;

Fig. 2 is an exploded perspective view of the tacky mat stack of Fig. 1 with a portion of the frame broken away and some of the mat sheets arranged to show both their top and bottom surfaces;

Fig. 3 is an enlarged sectional view taken along the line 3—3 of Fig. 2 illustrating the composite laminar construction of a single mat sheet; and

Fig. 4 is an enlarged perspective view of the improved pull tab portion of the tacky mat stack illustrating the ease with which an overlying adhesive sheet can be removed from the stack.

Referring now to the drawing in greater detail wherein like reference numerals indicate like parts throughout the several figures, a tacky mat assembly 10 is illustrated as being comprised of a generally rectangular mat stack 12 of flat superimposed adhesive sheet material securely mounted within an appropriate frame member 14. Although the particular frame used with the stack may be of the type described in greater detail in my earlier United States Patent No. 3,083,393, the illustrated frame 14 is of a type having a flat base 16 to which the stack 12 is directly adhered and from which it is subsequently stripped. The frame may be made of any suitable material, such as aluminum.

The assembly 10 including the stack 12 of pressure-sensitive adhesive sheets is usually located within a pedestrian traffic passageway and is particularly useful in the industrial field where delicate or dust-free manufacturing operations or techniques are performed or where environmental control is essential, such as in clean rooms and the like. It will, of course, be appreciated that the tacky mat stack of the present invention also has beneficial hospital uses, as at the entry to operating rooms or other areas wherein control of dust particles is desired.

As described in my aforementioned patents, the stack may be mounted on a flat, generally rectangular base member, such as a "Masonite" (Registered Trade Mark) board having dimensions slightly greater than the adhesive sheets carried thereby. However, as illustrated in Fig. 2, the stack 12 of the present invention is advantageously applied directly to the base 16 of the frame 14 and fully removed therefrom in a sequential manner after use of each uppermost sheet.

The lowermost adhesive sheet 18 of the stack 12 is generally of the type described in my earlier patents in that it is double faced with adhesive while the remaining or overlying sheets 20 are substantially identical, have adhesive on only the tread surface thereof and incorporate the composite laminar sheet construction of the present invention. The bottom surface 24 of lowermost sheet 18 is provided with a full coating of highly tacky adhesive for securely attaching that sheet to the base 16 of the frame. As will be appreciated, the adhesive on the surface 24 preferably possesses

greater bonding or adhering power than the adhesive on the top or tread surface 26 of sheet 18 in order to assure firm attachment of the stack to the frame when the superimposed sheets are peeled from the stack.

As mentioned, each of the overlying sheets 20, usually about nine in number, are substantially identical. Accordingly, for ease of illustration and clarity of understanding only one such sheet structure will be described in detail. Unlike the adhesive coated heavy cloth sheets described in my aforementioned patents, the pressure-sensitive adhesive coated sheets 20 of the present invention are composite laminar structures which rely to some degree upon the cooperative and coating reinforcement of the different components of the structure to provide the desired strength characteristics thereof.

Referring specifically to Fig. 3, each composite adhesive sheet structure 20 is comprised essentially of a thin pliable support film 30 on which rests a fibrous reinforcing web material 32 of gauze-like open weave embedded within a coating 34 of adhesive. In the preferred embodiment illustrated, the adhesive coating 34 extends through the gauze web 32 so as to contact and securely adhere to the support film 30. This effects not only an anchoring or bonding of the gauze-like material to the support but also provides operating unity and integrity between the components of the composite laminar structure. That is, each component of the structure cooperates with the other components to structurally reinforce the sheet.

It will be appreciated that a single layer of gauze-like fabric has only a low degree of tear strength and may readily rip when subjected to a force such as that encountered during sheet separation from the stack. Such low strength material with its open weave would not ordinarily be suited for use as a replacement for the cloth backing used heretofore. By the same token, a thin pliable film of high flexibility and fine gauge is also susceptible to easy rupture and tear. However, in accordance with the present invention the adhesive combination of the weak open-weave gauze-like fabric and the thin pliable film causes cooperative reinforcement of each structural component and mutual reinforcement thereof.

The film 30 utilized as a base or support in the composite laminar structure of the present invention is preferably a thin flexible member having a smooth, flat, exposed bottom surface 36 that will releasably adhere to the pressure-sensitive adhesive of an underlying sheet yet be impermeable thereto. Thus, the film forms a continuous or uninterrupted barrier which prevents flow

of the adhesive therethrough from either above or below the film despite its thin gauge and susceptibility to tearing. The film found to give good results is generally of a thickness n greater than about 0.010 inch and usually of 0.005 inch and less in thickness. Plastic films, such as films of vinyl polymers and copolymers as well as polyethylene and similar materials, possess these desired characteristics. Additionally, the plastic films do not tend to dry up and become brittle with age and exhibit good elongation, pliability and flexibility characteristics coupled with the ability to releasably adhere to the confronting pressure-sensitive adhesive coating of an adjacent underlying sheet. It will, of course, be appreciated that the excellent chemical resistance of such films does not prevent the secure bonding of the open gauze-like fabric to the film by the adhesive coating 34 applied to the top surface thereof.

The fibrous web material 32 embedded within the pressure-sensitive adhesive coating 34 and secured to the plastic film thereby is preferably a gauze-like fabric of open-weave construction. However, similar highly porous fibrous structures such as scrims or other nonwoven webs could be utilized in accordance with the present invention to cooperate with the plastic films and provide the desired reinforced strength characteristics needed in the composite sheet.

The particular pressure-sensitive adhesive coating utilized to form the tread surface 38 of each sheet 20 and adhere the web 32 to the film in accordance with the present invention should be of moderate tackiness. It is also necessary that the pressure-sensitive adhesive composition be of the type which retains its tackiness over an extended period of time. Such material is generally of the type found in masking tape and, in essence, is substantially the same as that described in my earlier United States Patent No. 3,083,393.

An added feature is the utilization of pull tabs 42 on one corner of each adhesive surface of the sheets to facilitate stripping of each uppermost sheet from the remainder of the tacky mat stack. In the preferred embodiment illustrated, this takes the form of a small generally rectangular piece of nontacky material, such as a tough, dimensionally stable polyester film, e.g., "Mylar" (Registered Trade Mark) sold by E. I. du Pont de Nemours, of about 1 mil thickness in firm adhesive contact with the tread surface 38 of each composite sheet structure. The tab 42 is provided with a leaf portion 44 extending beyond the edge of the adhesive sheet and folded back to facilitate easy grasp thereof by those persons responsible for stripping the uppermost sheet from the mat stack. The remainder of the

tab, which may contain identifying indicia such as a trademark or the like, is securely fastened to the adhesive sheet and, as will be appreciated, is in confronting relationship with the plastic film on the undersurface of a superimposed sheet so that there is plastic-to-plastic nonadhesive contact therebetween at one corner of each sheet.

The bottom sheet 18 of the stack 12 also is provided with a tab 42 on both adhesive surfaces to assure the presence of an initial stripping area free of adhesive between the sheet 18 and base plate 16 of the frame. Thus, it is quite easy for the operator to merely grasp the folded leaf portion 44 of the exposed tab 42 and lift the uppermost sheet from the underlying member in the area where there is no intervening adhesion. As shown, the tab 42 is of sufficient size to provide a good gripping area and permit continued peeling of the superimposed sheet structure from the stack.

As will be apparent to persons skilled in the art, various modifications, adaptations and variations of the foregoing specific disclosure can be made without departing from the teachings of the present invention.

WHAT I CLAIM IS:—

1. A tacky mat stack suited for the passage of pedestrian traffic thereacross and the concurrent adhesive removal of dirt particles from said traffic by the tread surface on the uppermost sheet of said stack, and comprising a plurality of superimposed tacky mat sheets of composite laminar construction wherein each superimposed sheet comprises a flexible support film having an integral adhesive-impermeable barrier surface extending across essentially the full underside thereof and a pressure-sensitive adhesive coating carried on the top side of said support film and forming an upwardly facing pressure-sensitive adhesive tread surface of the sheet, said coating being in secure nondelaminating engagement with said support film to provide said composite laminar structure, said barrier surface preventing penetration therethrough of the adhesive carried by an underlying sheet and consequent adhesive welding of superimposed sheets during the passage of pedestrian traffic across the stack, and said barrier surface facilitating easy separation of each topmost sheet after passage of pedestrian traffic thereon while preventing inadvertent relative movement between the superimposed sheets of the stack.

2. A tacky mat stack as claimed in claim 1, having a reinforcing fibrous web co-

extensive with said film and secured to the top side thereof, the pressure-sensitive adhesive coating being in secure penetrating engagement with said reinforcing fibrous web.

3. A tacky mat stack as claimed in claim 2 wherein the flexible support film is a solid plastics sheet carrying both the reinforcing fibrous web and the adhesive coating, the barrier surface of said film being disposed in overlying confronting relationship with the pressure-sensitive adhesive of an underlying sheet.

4. A mat stack as claimed in claim 3 wherein the film of plastics has a thickness less than 0.01 inch.

5. A mat stack as claimed in claim 2, 3 or 4 wherein the fibrous web exhibits an open, gauze-like network facilitating penetration of the adhesive coating therethrough into secure engagement with the support film.

6. A mat stack as claimed in any preceding claim wherein a portion of the tread surface of each sheet is provided with a gripping member engaging one edge of the sheet, said member being in confronting relationship with the barrier surface of an overlying sheet to provide constant non-adhering contact therebetween at said one edge thus facilitating initial separation of the overlying sheet from the stack.

7. A tacky mat stack as claimed in any preceding claim, wherein a portion of the upwardly facing tread surface of each sheet is provided with a pull tab having a gripping portion extending freely from the sheet, said tab extending from the edge of the sheet and cooperating with said barrier surface of the overlying sheet to provide constant nonadhesive contact between superimposed sheets at said edge portion, said gripping portion being interposed between the pull tab and the barrier surface of the overlying sheet for exposure upon removal of the overlying sheet.

8. A mat stack as claimed in claim 7 wherein the sheets are generally rectangular planar members and the pull tab is a plastics film of high tear strength positioned at one corner thereof to prevent adhesion between adjacent sheets at said one corner.

9. A stack as claimed in claim 7 or 8 wherein the pull tab is a polyester film of about 1 mil thickness.

10. A tacky mat stack substantially as described with reference to the accompanying drawing.

MARKS & CLERK.

